For once in the spotlight: Alfred Russel Wallace

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Abstract: The British naturalist Alfred Russel Wallace (1823-1913) is, together with Charles Darwin, the co-discoverer of the theory of evolution by natural selection and established the scientific foundation for biogeography. At the end of his life he was one of the most well known scientists in the world, nowadays he is almost forgotten by the general public. This chapter focuses on Wallace, his life and his achievements. For once Wallace is out of Darwin's shadow, and in the spotlight.

Key words: Alfred Russel Wallace, Charles Darwin, Sarawak Law, Ternate essay, evolution, biogeography, Aru islands.

'Are you looking for something?' the old man on the veranda asked. He had observed me closely, while I walked up and down the street in the city of Ternate, on a perfect volcano island with the same name in the Moluccas.

A dirty white singlet covered his big belly. He pulled it up and stroked his bare belly like a pregnant woman: gently and carefully.

'The house of Wallace, Alfred Russel Wallace,' I answered the man. 'It supposed to be somewhere near here.'

'Ah, wait a second,' he said, and yelled inside his house.

Seconds later a young tall slender boy came out and walked with me in the direction of the mighty Gamalama volcano. A few hundred meters up the road he stopped.

'This is it,' he said, while pointing at a new looking house.

I was rather disappointed. In his book *The Malay Archipelago* (1869) Wallace gave a quite precise description of the house and its location, and I simply could not believe that the modern looking house was that specific house. The house Wallace rented during the years he spent in the eastern part of the Malay Archipelago, and where he returned to after spending months in the jungle, rearranging his collections and recovering from tropical diseases.

But who was Alfred Russel Wallace, and why put such an effort into finding this specific house in Ternate?

Alfred Russel Wallace was born on January 8th 1823, into a middle class English family in a little village close to Usk, Monmouthshire. He was the eighth of nine children. The first years of his life were carefree, until his father lost the modest family capital with some poor investments and bad speculations. The consequence of it this was that Wallace had to leave school at the age of fourteen, thus ending his formal education. From that moment an academic career was out of reach.

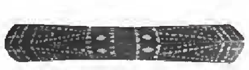
In 1837 he found a job as a trainee land surveyor at the company of his elder brother William. While roaming the English and Welsh countryside, Wallace developed a passion for geology and natural history.

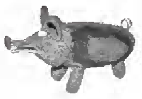
Six years later, in 1843, his brother could no longer afford to employ Wallace, as there was not enough work available. A few months later Wallace found a job as a teacher in a school in Leicester, where he met Henry Walter Bates, who was an ardent beetle collector. Together they read books on natural history, discussed scientific topics and collected beetles and other insects in the countryside around Leicester.

In 1845 Wallace read the anonymously published book *Vestiges of the Natural History of Creation*. He was intrigued by the idea of species transmutation discussed in the book, the author of which was only revealed to be Robert Chambers many years later.

Wallace and Bates fantasized to go on an expedition to a tropical country. The trade in exotic birds and insects was flourishing, with a great demand for exotic species.

After reading *The voyage of the Beagle* by Charles Darwin and William Henry Edwards *Voyage up the River Amazon, with a Residency at Pará*, they decided to travel to South America and collect birds and insects in the Amazon, both for their private collections and to sell in order to fund their trip. In a letter to Bates, Wallace revealed his scientific plan:





I begin to feel rather dissatisfied with a mere local collection - little is to be learned by it. I sh$^{d.}$ like to take one family, to study thoroughly - principally with a view to the theory to the origin of species.

They left England in 1848, and collected a couple of months together in the lower Amazon before they decided to split up and collect independent. In 1849, Wallace's younger brother Herbert travelled to the Amazon to assist him. Two years later, in 1851, Herbert decided that collecting was not what he wanted, and went back to Pará. Before he was able to join a vessel back to England he caught yellow fever and died.

Wallace heard the sad news much later. He travelled up the Rio Negro, further than any European before him.

After four years of collecting, Wallace decided to return to England. He travelled back to Pará, visited the grave of his brother and checked in on board the brig "Helen", a cargo ship loaded with rubber, cocoa, balsam etc.

After almost four weeks into the voyage, in the middle of the Atlantic Ocean, the ship caught fire. Wallace was able to grab a tin box with a few drawings of fish and palm trees, a couple of shirts and his watch from his cabin, before he jumped into a lifeboat. Not long after the "Helen", including his diaries and stuffed animals, sank before his eyes. In a letter to his friend and colleague Richard Spruce Wallace wrote:

My collections however were in the hold & were irrevocably lost. And now I began to think, that almost all the reward of my four years of privation & danger were lost. (...) All my private collection of insects & birds since I left Pará was with me, & contained hundreds of new & beautiful species which would have rendered (I had fondly hoped) my cabinet, as far as regards American species, one of the finest in Europe.

Luckily 10 days later a passing ship rescued Wallace and the crew, and they eventually reached England (after almost sinking in a storm on the way!). But instead of slipping into a depression, Wallace was upbeat. He wrote two books (one on palm trees and one about his South-American voyage), lectured to scientific societies and looked for a new tropical destination to build up a new collection of specimens.

In 1854, within eighteen months after his return from South America, Wallace left England for The Malay Archipelago, a white spot on the map of exploration. Charles Allen, a young boy that he taught how to pin insects and shoot and skin birds, accompanied him.

He started his journey in Singapore (where the tigers still roared in the jungle on Bukit Timah), followed by peninsular Malaysia, before he ended up in Sarawak, Borneo. Here he combined collecting with writing (scientific) papers, which he sent to magazines or to his agent Samuel Stevens. During the rainy season, when collecting was not possible, he dedicated his time to the big question of the origin of species. With this issue on his mind he wrote 'On the Law which has regulated the Introduction of New Species'. In this article, in which he included ideas on geology and geography, he formulated what is now known as his 'Sarawak Law':

Every species has come into existence coincident both in time and space with a pre-existing closely allied species.

In this article Wallace was not able to provide a mechanism to explain how species evolve, but it paved the road for the next step.

Darwin read the article, published in 1855 in 'The Annals and Magazine of Natural History', but thought it was nothing new. Sir Charles Lyell, leading geologist and friend of Darwin, later pointed out the importance of it to him and urged Darwin to publish his ideas on the origin of species.

But it was to late. In 1858, three years after the publication of the Sarawak Law, Wallace wrote an essay entitled: 'On the Tendency of Varieties to Depart Indefinitely From the Original Type'.

Days before he completed the Ternate essay, as it is known today, Wallace was suffering from malaria. He says in *Natural Selection and Tropical Nature*:

At the time I was suffering from a rather severe attack of intermittent fever at Ternate in the Moluccas, and one day while lying in my bed during the cold fit, wrapped in blankets, though the thermometer was at 88°F., the problem again presented itself to me, and something let me to think of the "positive checks" described by Malthus in his "Essay on Population," a work I had read several years before, and which had me deep and permanent impression on my mind. These checks - war, disease, famine and the like - must, it occurred to me, act on animals as wall as on man. Then I thought of the enormously rapid multiplication of animals, causing these checks to be much more effective in them than in the case of man; and while pondering *vaguely on this fact there suddenly flashed upon me the idea of the survival of the fittest - that the individuals removed by these checks must be on the whole inferior to those that survived.*

After Wallace was recovered he wrote the ideas down in three successive evenings, and sent them immediately to Darwin, with whom he had corresponded. In the accompanying letter he asked him to send the essay to Lyell, at least if he thought it was worth reading.

When Darwin received the letter from Wallace he must have felt devastated, as shown by a letter he wrote to Charles Lyell:

My dear Lyell,

Some year or so ago, you recommended me to read a paper by Wallace in the Annals, which had interested you & as I was writing to him, I knew this would please him much, so I told him. He has to day sent me the enclosed & asked me to forward it to you. It seems well worth reading. Your words have come true with a vengeance that I sh^d *be forestalled. You said this when I explained to you here very briefly my views of 'Natural Selection" depending on the struggle for existence. - I never saw a more striking coincidence. If Wallace had my M.S. sketch written out in 1842 he could not have made a better short abstract! Even his terms now stand as Heads of my Chapters.*

Please return me the M.S. which he does not say he wishes me to publish; but I shall of course at once write & offer to send to any Journal. So all my originality, whatever it may amount to, will be smashed. Though my book, if it will ever have any value, will not be deteriorated; as all the labour consists in the application of the theory.

I hope you will approve of Wallace's sketch, that I may tell him what you say.

My dear Lyell
Yours most truly
C. Darwin

Darwin was overwhelmed by the Ternate essay, and did not know what to do. His friends Charles Lyell and the botanist Joseph Dalton Hooker proposed to Darwin to read two manuscript fragments of Darwin's writings on evolution plus the Ternate essay before the Linnean Society, and then publish them in the Society's Journal. Hooker prepared the publication as one can see from the following letter:

My dear Hooker,

I have read your letter & see you want papers at once. I am quite prostrated & can do nothing but I send Wallace & my abstract of abstract of letter to Asa Gray, which gives most imperfectly ***only*** *the means of change & do not touch on reasons for believing species do change I daresay all is too late. I hardly care about it. - But you are too generous to sacrifice so much time & kindness. - It is most generous, most kind. I send sketch of 1844* ***solely*** *that you may see by your own handwriting that you did read it. - I really cannot bear to look at it. - Do not waste much time. It is miserable in me to care al all about priority. - The table of contents will show what it is. I would make a similar, but shorter & and more accurate sketch for the Linnean Journal. - I will do anything.*

God Bless you my dear kind friend. I can write no more. I send this by servant to Kew.

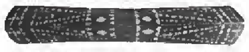
Yours C. Darwin

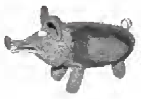
Hooker and Lyell finally presented Darwin and Wallace's 'joint' paper to the Linnean Society on the 1st July 1858. It was entitled: *On the Tendency of Species to form Varieties; and on the Perpetuation of varieties and species by Natural Means of Selection*.

Neither Darwin nor Wallace was present during the public reading. Darwin sadly attended the funeral of one of his children, while Wallace was still in the Malay Archipelago.

The reactions were as one can expect. One of the members of the Society, professor Samuel Haughton from Dublin, commented on the printed version of the papers. In his autobiography, Darwin summarized the reception of the papers as: 'All that was new was false, and what was true was old.'

It was more than a year and a half of turmoil for Darwin, starting with the Ternate essay in his mailbox in June 1858 and ending with the publication of his book *The Origin of Species* in November 1859. The question is why Darwin waited so long before publication of his own theory. I can think of two reasons: first he himself was his own biggest critic. He wanted to gather as much evidence to support the idea of evolution before he publishing the theory of natural selection. Therefore he conducted experiments in his backyard and in his greenhouses, he discussed his ideas with his scientific friends





like Huxley, Hooker, Lyell and the American botanist Asa Gray (who read one of the first sketches on evolution by natural selection), and he corresponded with people who were able to provide him with information from all over the world. His idea was to write it all down in one book on evolution. Of course this idea was harshly disturbed by Wallace's essay. Another reason why he did not want to publish might have been the church. Religion was strongly involved in the social class Darwin comfortably lived in. In a letter to Joseph Hooker, Darwin famously wrote that it (the idea of evolution by natural selection) felt like confessing to a murder.

Even within Down House religion was strongly present, since Darwin's wife Emma was very religious. It was 'the important subject' between them, as Emma called it, and she strongly believed that Darwin could be a believer, if he stopped questioning.

Rivalry and plagiarism

One often hears the accusation of plagiarism by Darwin: that he copied ideas from Wallace's Ternate essay into his own writings. The main issue is when exactly Darwin received Wallace's letter and did he keep it to himself for several days or weeks before sending it to Lyell and Hooker? According to a study by John van Wyhe and Kees Rookmaaker (New Theory to Explain the Receipt of Wallace's Ternate Essay by Darwin in 1858) published in the *Biological Journal of the Linnean Society* in 2012 Darwin received Wallace's letter and essay when he said he did, so he would not have had an opportunity to steal ideas from it.

A more interesting question though, is whether Darwin (and Lyell and Hooker) should have asked Wallace for permission before publishing the Ternate essay, since Wallace did not ask Darwin to publish it, but only asked him to send it to Lyell.

Is it ethical to publish someone's ideas without asking for permission? No, I would say.

On the other hand, it does not seem that Wallace had problems with the publication, and it does not seem that he blamed Darwin for publishing his text. In 1869 he dedicated *The Malay Archipelago* to Darwin, stating: 'As a token of personal esteem and friendship, but also to express my deep admiration for his genius and his works.'

Twenty years later, in 1889, he published a book about the theory of evolution by natural selection and its applications, entitled *Darwinism*, out of respect for Darwin (although it is quite likely that the term 'Darwinism' was synonymous with 'evolution by natural selection', and not used by Wallace as an homage to Darwin).

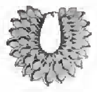
In his acceptance speech for the reception of the first (gold) Darwin-Wallace medal from the Linnean Society in 1908, Wallace said the following:

With your permission I propose to make a few remarks both as to the actual relations between Darwin and myself prior to July 1858, and also to some peculiarities of our respective life-histories which brought about those relations, and which will, I hope, be both novel and of some general interest.

Since the death of Darwin in 1882, I have found myself in the somewhat unusual position of receiving credit and praise from popular writers under a complete misapprehension of what my share in Darwin's work really amounted to. It has been stated (not unfrequently) in the daily and weekly press, that Darwin and myself discovered "natural selection" simultaneously, while a more daring few have declared that I was the first to discover it, and that I gave way to Darwin!

In order to avoid further errors of this kind (which this Celebration may possibly encourage), I think it will be well to give the actual facts as simply and clearly as possible.
The one fact that connects me with Darwin, and which, I am happy to say, has never been doubted, is that the idea of what is now termed "natural selection" or "survival of the fittest," together with its far-reaching consequences, occurred to us independently, and was first jointly announced before this Society fifty years ago.

But, what often is forgotten by the press and the public, is that the idea occurred to Darwin in October 1838, nearly twenty years earlier than to myself (in February 1858); and that during the whole of that twenty years he had been laboriously collecting evidence from the vast mass of literature of Biology, of Horticulture, and of Agriculture; as well as himself carrying out ingenious experiments and original observations, the extent of which is indicated by the range of subjects discussed in his 'Origin of species,' and especially in that wonderful store-house of knowledge - his 'Animals and Plants under Domestication,' almost the whole materials for which works had been collected, and to a large extent systematised, during that twenty years.



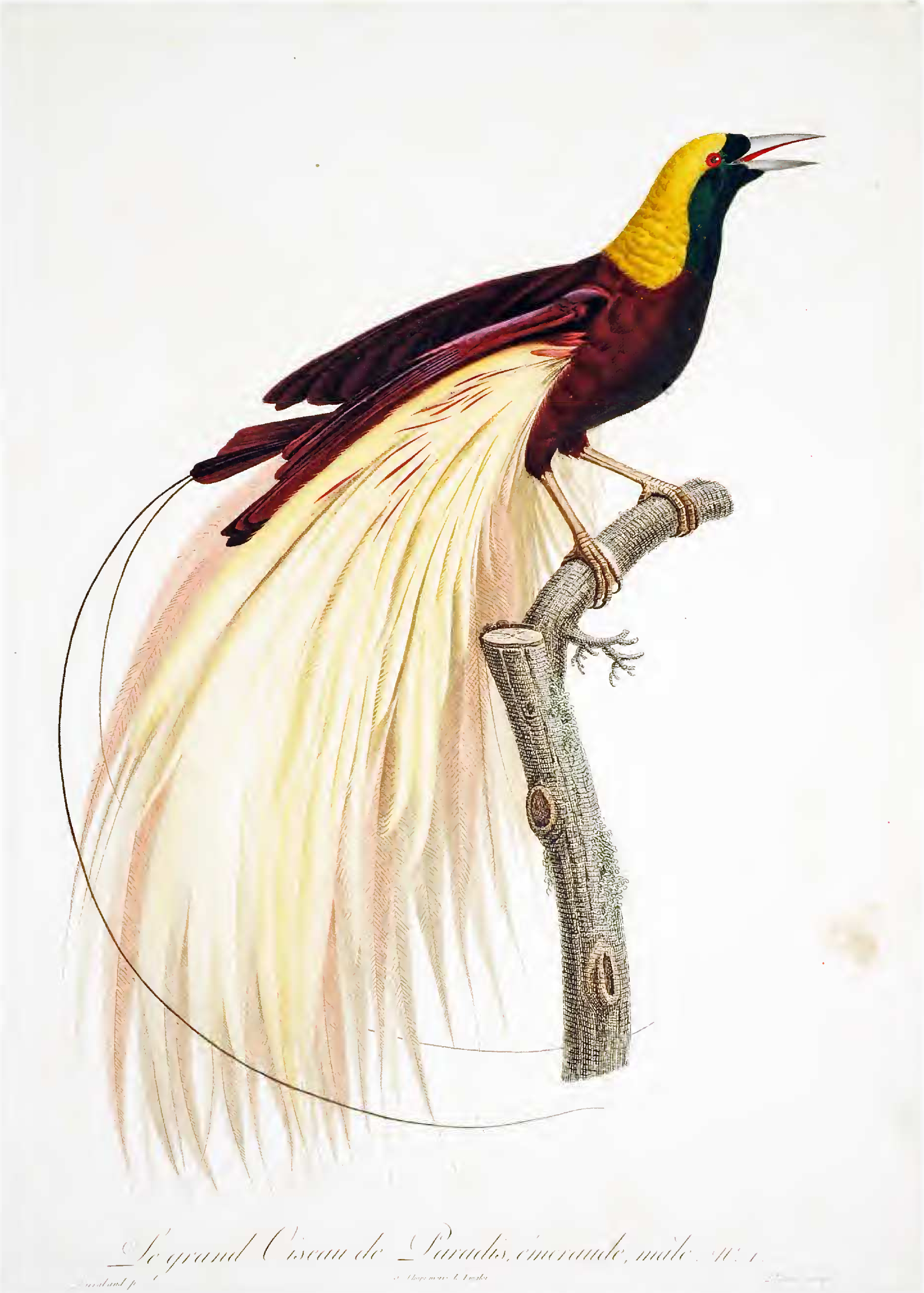

Le grand Oiseau de Paradis, émeraude, mâle. N.° 1.

Figure 1. Greater Bird of Paradise (*Paradisaea apoda* Linnaeus, 1758), drawn by the French illustrator Jacques Barraband, published by François LeVaillant in 1806 (© Artis Library, Special Collections of the University of Amsterdam).

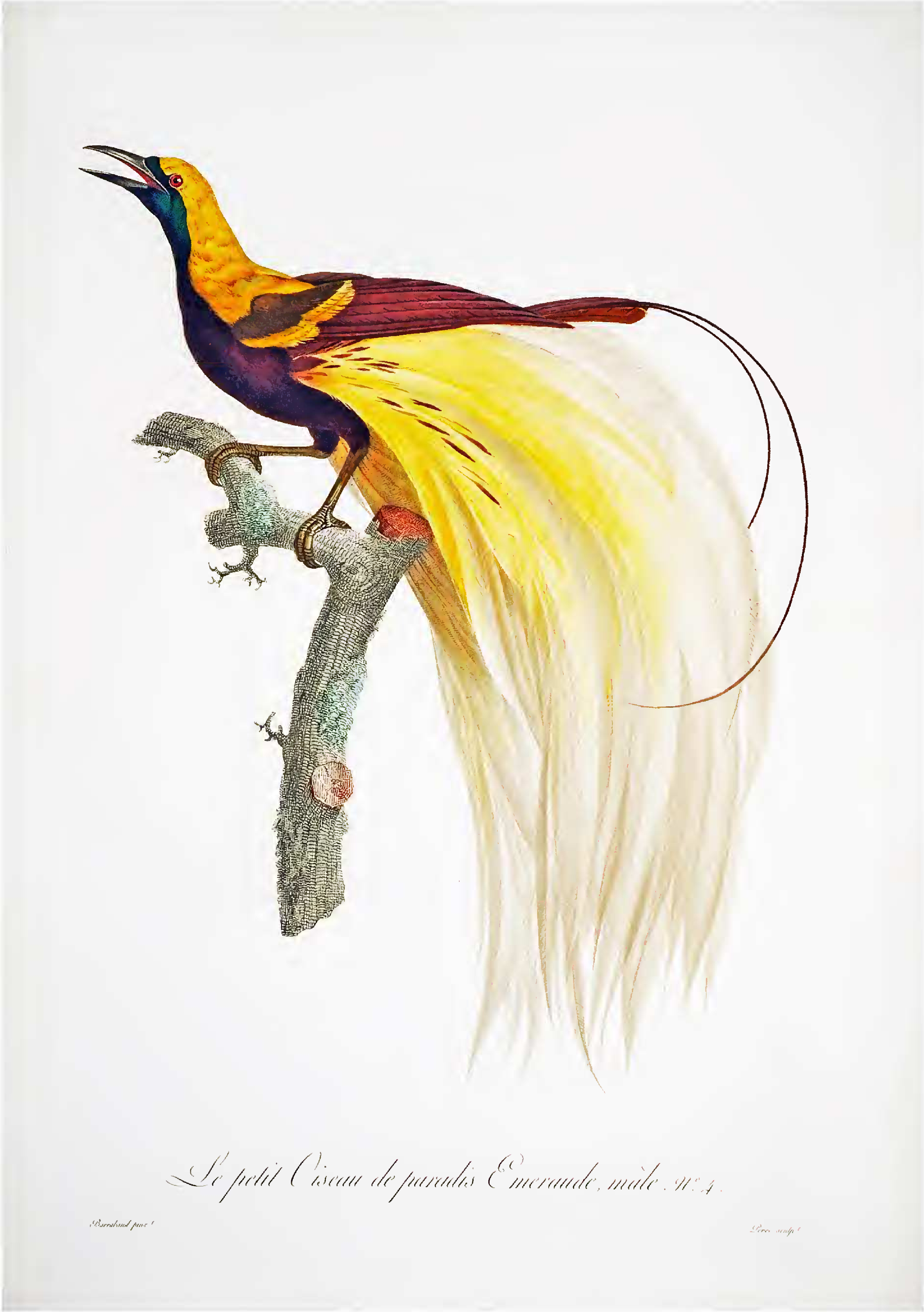

Le petit Oiseau de paradis Emeraude, mâle. N.° 4.
Barraband pinx.t
Perée sculp.t

Figure 2. Lesser Bird of Paradise (*Paradisaea minor* Shaw, 1809), drawn by the French illustrator Jacques Barraband, published by François LeVaillant in 1806 (© Artis Library, Special Collections of the University of Amsterdam).

Of course, one might say that this text was read during a public appearance, and therefore Wallace was being courteous.

But in 1858, fifty years before he received the Darwin-Wallace medal and when he was still in the Malay Archipelago, Wallace sent a letter to his mother. When reading the letter, it seems that Wallace had no problems with the publication of the manuscript by the Linnean Society. Indeed it filled him with pride and hope for the future, back in England:

I have received letters from Mr Darwin & Dr Hooker, two of the greatest most eminent Naturalists in England which has highly gratified me. I sent Mr Darwin an essay on a subject in which he is now writing a great work. He shewed it to Dr Hooker & Sir C Lyell, who thought so highly of it that they immediately read it before the "Linean [sic!] *Society". This insures me the acquaintance and assistance of these eminent men on my return home.*

It is more than 150 years since the publication of the joint paper by Darwin and Wallace, and *The Origin of Species*, and there is no doubt that these two publications have changed our view of the world and its creation radically. With their theory, Wallace and Darwin gave us a plausible alternative for the biblical story of creation. New techniques, like DNA, have confirmed and strengthened the ideas of the two British naturalists. Every day new research is conducted and presented in conferences, in scientific journals or in books like this: *Biodiversity, Biogeography and Nature Conservation in Wallacea and New Guinea*, which furthers our understanding of the evolution of life on our planet.

The distribution of animals

The fact that Wallace jointly published the theory of evolution by natural selection with Darwin should have in itself justified a state funeral in Westminster Abbey and a statue in central London (neither of which he got), but it is not all he contributed to biology.

One of the most fascinating aspects of Wallace is the fact that at the same as he was writing about evolution he was also developing new ideas about biogeography, or the study of distribution of animals and plants.

In the first four years in the Malay Archipelago Wallace travelled from West to East and observed two completely different faunas. In a letter he sent from Ambon to his friend and former travel companion Henry Walter Bates, a few weeks before he wrote the Ternate essay, Wallace described his observations about animal distribution:

In this archipelago there are two distinct faunas rigidly circumscribed, which differ as much as those of South-America and Africa, and more than those of Europe and North-America: yet there is nothing on the map or on the face of the islands to mark their limits. The boundary line often passes between islands closer than others in the same group. I believe the western part [of the Archipelago] to be a separated portion of continental Asia, the eastern the fragmentary prolongation of a former Pacific continent.

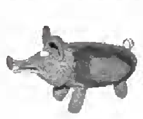
After he returned to England after eight years in the Archipelago, he presented his elaborated ideas before the Royal Geographical Society, including the idea of a sharp line that divides the two faunal regions:

To define the limits of the two regions where they are (geographically) most intimately connected, I may mention that during a few days' stay in the island of Bali I found birds of the genera Copsychus, Megalaima, Tiga, Plocius and Sturnopastor, all characteristic of the Indian region and abundant in Malacca, Java, and Borneo; while on crossing over to Lombock, during three months collecting there, not one of them was ever seen; neither have they occurred in Celebes nor in any of the more eastern islands I have visited. Taking this in connexion with the fact of Cacatua, Tropidorhynchus and Megapodius having their western limit in Lombock, we may consider it established that the Strait of Lombock (only 15 miles wide) marks the limits and abruptly separates two of the great Zoological regions of the globe.

This line is now known as the Wallace Line. Thomas Henry Huxley coined the term in an article published in the *Proceedings of the Zoological Society*, in 1868.

Actually, Wallace was not the last to draw a line through the archipelago to divide the faunal regions. In 1977, the American palaeontologist George Gaylord Simpson published a paper in the *Proceedings of the American Philosophical Society*, with the provocative title 'Too many lines; The Limits of the Oriental and Australian Zoogeographic Regions.'

In this article Simpson described seven differ-



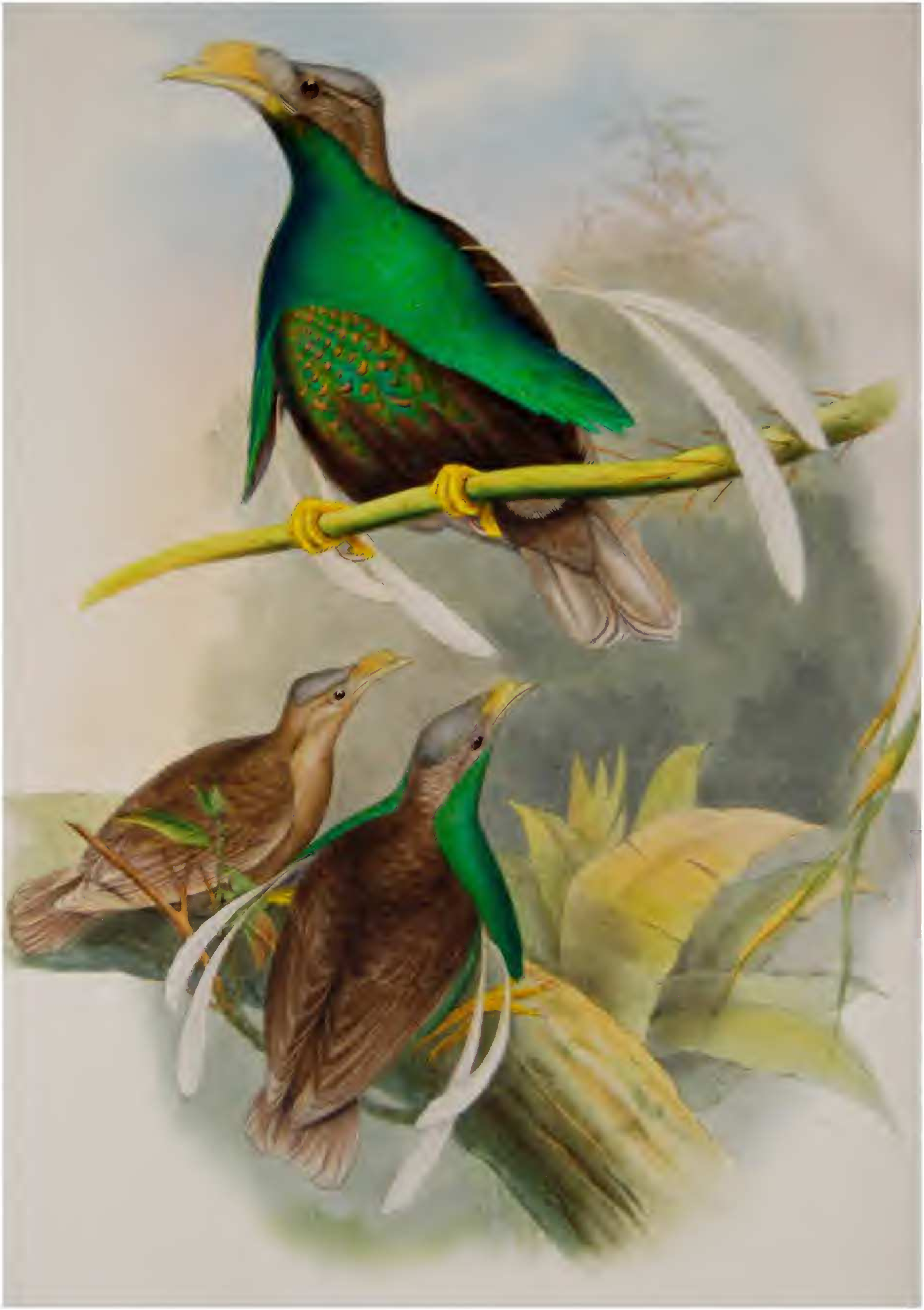


Figure 3. Wallace's Standardwing (*Semioptera wallacii* Gould, 1859), from the birds of New-Guinea, published by John Gould (© Artis Library, Special Collections of the University of Amsterdam).

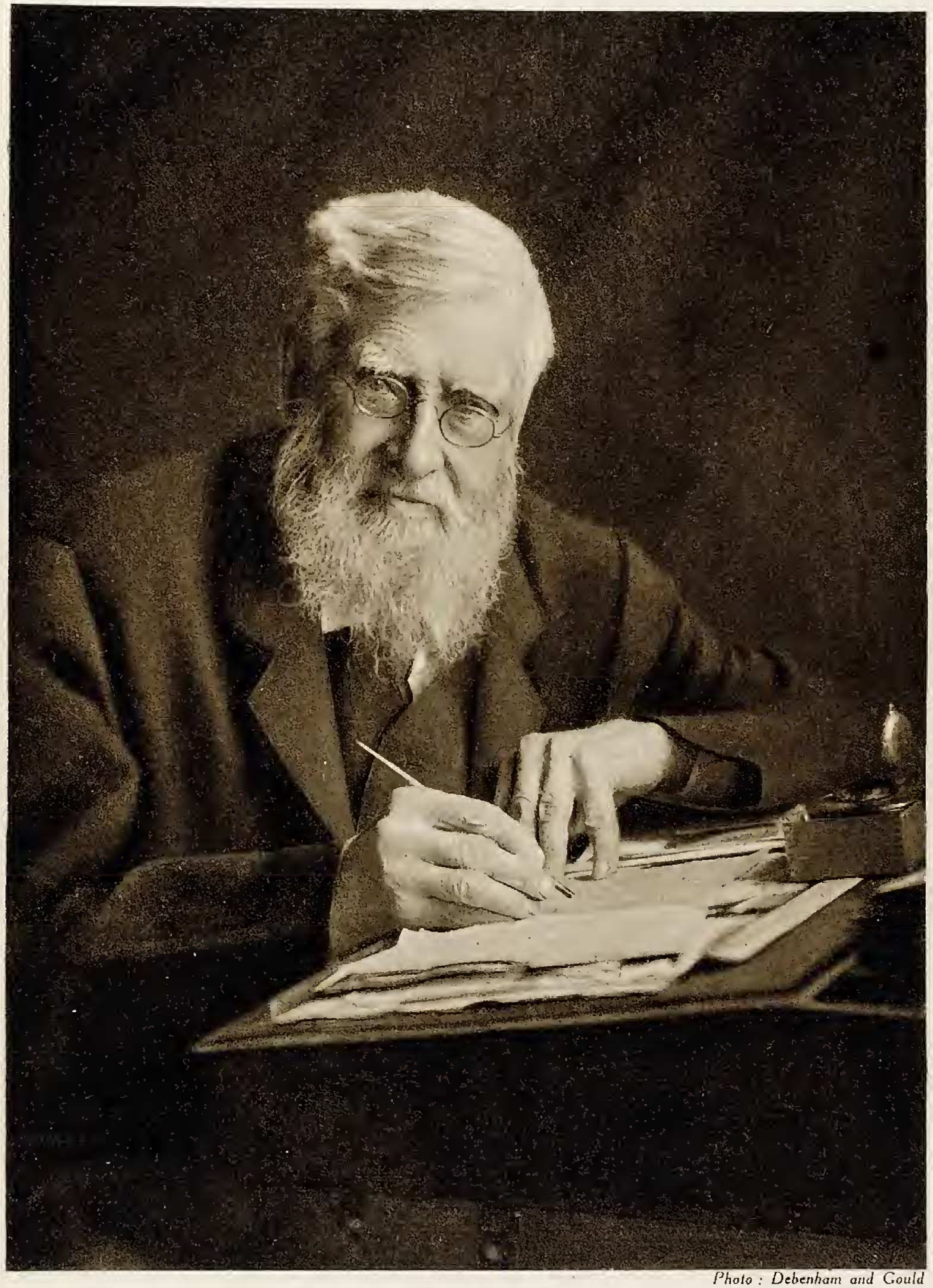


Photo : Debenham and Gould

A. R. WALLACE (1913)

Figure 4. Photograph of Alfred Russel Wallace, at the end of his life (© Artis Library, Special Collections of the University of Amsterdam).

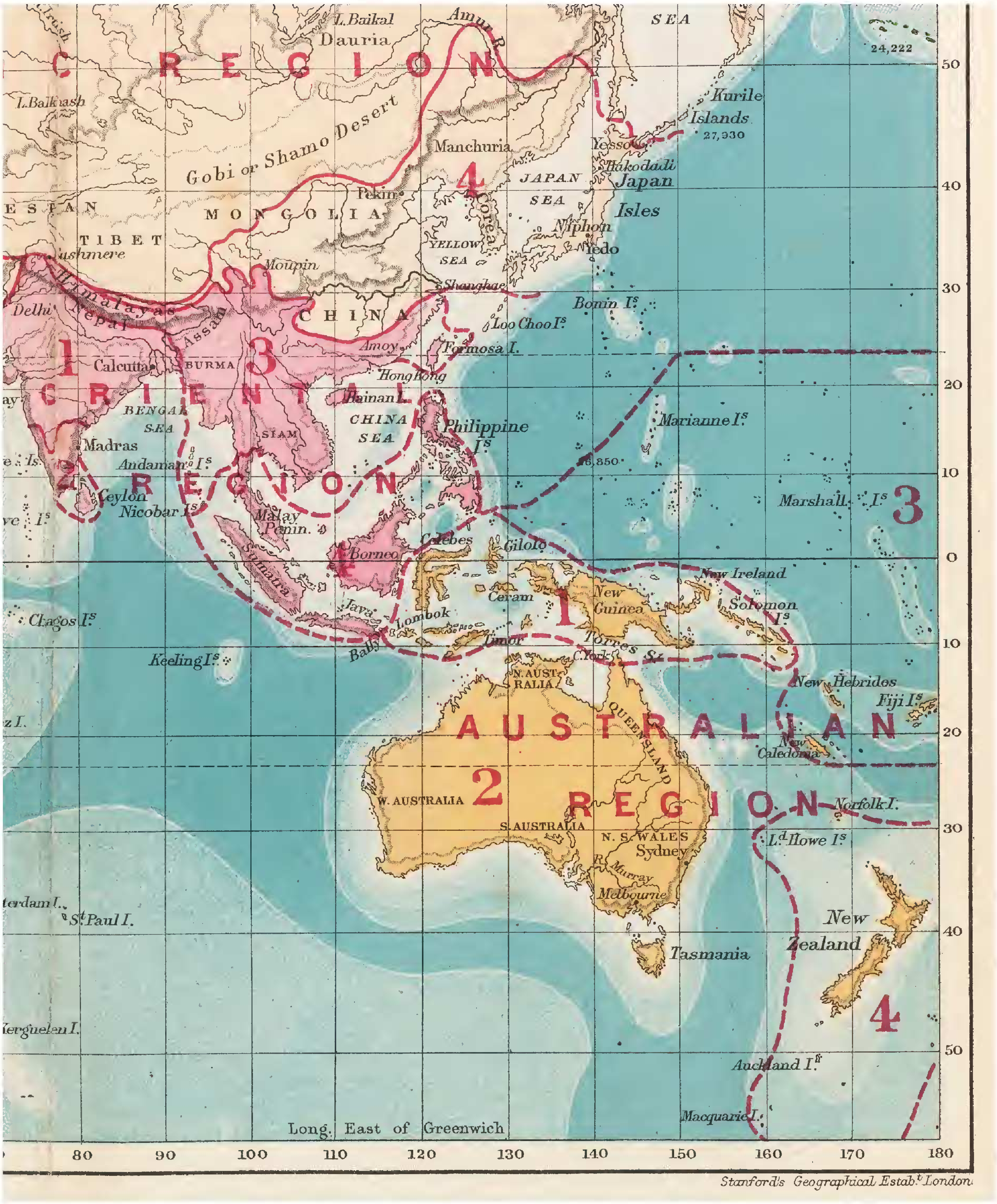


Figure 5. Part of the map with biogeographic regions, published in 'The Geographical Distribution of Animals' (© Artis Library, Special Collections of the University of Amsterdam).

ent lines in the Malay Archipelago. The result is a kind of spaghetti if one draws all the lines on one map. But above all it raises the question which one is the correct one?

In January 2013 an international group of scientists under the direction of Dr Ben Holt published an article in *Science*: 'An Update of Wallace's Zoogeographic Regions of the World.' Regarding the exact line dividing the Oriental and Australian regions they concluded that its location is determined by the technique used to do the analysis and faunal group that is analysed. But they were in favour of two lines: the Wallace Line, and the Weber line as modified by Ernst Mayr, which runs through the ar-

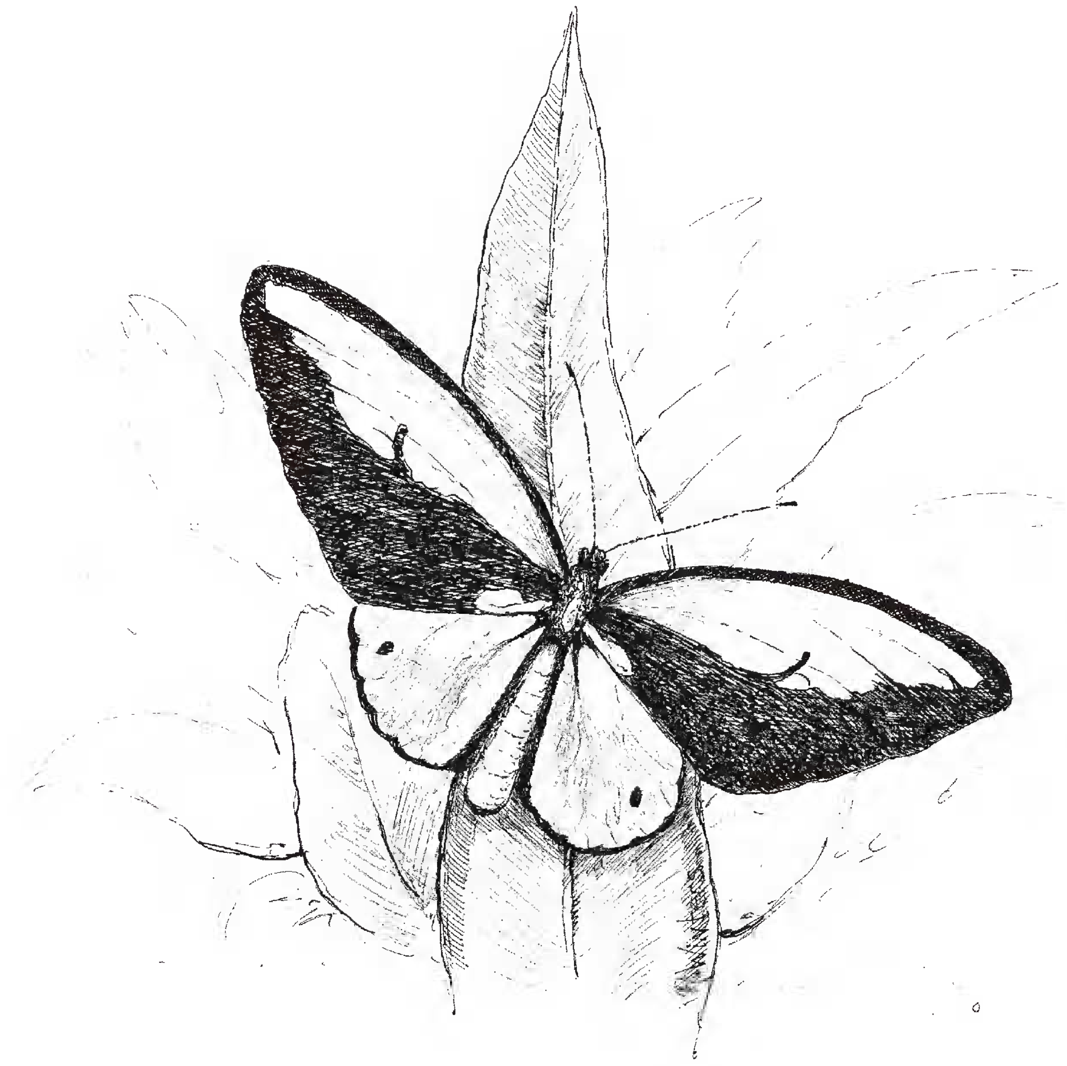


Figure 6. *Ornithoptera croesus* Wallace, 1859, drawn by Ria Winters, published in the book 'Reizen tussen de lijnen' by Alexander Reeuwijk (© Uitgeverij Atlas Contact).

chipelago east of the Wallace Line. Of course the article by Dr. Holt and colleagues is not a final paper on this complex and topic. About a half-year after publication, German scientists Holger Kreft and Walter Jetz commented on the article in Science. They questioned the new realms as proposed by Holt and colleagues. Kreft and Jetz state that it is too premature accept the new zoogeographic regions. Scientists should be careful to redefine new realms, since the analysing techniques are not fully developed yet.

This is all hard-core science, not accessible for the general public. Wallace served the broad audience, since in a way one can read *The Malay Archipelago* (1869), as an explanation of biogeography for a non-scientific audience. But Wallace wrote much more than this on biogeography. He published several articles and produced two scholarly books on the subject: *The Geographical Distribution of Animals*, a two-volume edition published in 1876, and *Island Life*, published in 1881. With these works Wallace provided a scientific basis for the study of biogeography, and it earned him the nickname 'father of biogeography'.

In his typical 'fin-de-siècle' overview, 'Biogeography on the eve of the twenty-first century: Towards an epistemology of biogeography', Francois Vuilleumier summarized Wallace's merits by quoting David Quammen:

> *Wallace did nothing less than establish the foundation of a science of biogeography, a foundation that has lasted well into the 20th century. Not only did he describe all the major patterns of distribution known at the time, including continental and insular patterns, disjunction patterns and dispersal pathways, but also he offered evolutionary explanations for them. The breadth and depth of Wallace's thinking cannot be overemphasised. What I consider especially significant is that Wallace's understanding of biogeography was based on extensive fieldwork.*

Wallace's Standard Wing and Golden Bird Wing

It may seem that Wallace started as an insect and bird collector in England and South America, and ended up as a theoretician in the Malay Archipelago, with evolution by natural selection and biogeography as his main subjects, but this is incorrect. Wallace kept collecting through his eight years in Southeast Asia. He returned to England with more than 125 000 specimens, of which thousands were new to science.

His most famous specimens were perhaps Wallace's Standardwing (*Semioptera wallacii* Gould, 1859, the bird of paradise he discovered) and the Golden Birdwing butterfly (*Ornithoptera croesus* Wallace, 1859), he caught in Bacan, a little island next to Halmahera.

Nowadays, the easiest location to observe both specimens is Halmahera, the largest island of the Moluccas, not far from Ternate. There, in a little house along a river, lives bird specialist and protector of the forest, Demianus Bagali or Pak Anu.

The taxi boats to Halmahera leave every morning from the little quay beside the mosque in the centre of Ternate city. It is a short boat ride, of about 30 minutes, across the Molucca Sea. The island looks green; flanks of the volcanoes are covered with trees.

From the harbour village of Sindangoli it is a 15-minute ride on a motorbike to Pak Anu. He offers me a bed and is willing to show me the 'lek', the display tree of the bird of paradise.

That night I read the passages about the discovery of the bird in *The Malay Archipelago*. At first Wallace thought his boy Ali fooled him:

> *Just as I got home I overtook Ali returning from shooting with some birds hanging from his belt. He seemed much pleased, and said, "Look here, sir, what a curious bird," holding out what at first completely puzzled me. I saw a bird with a mass of splendid green feathers on its breast, elongated into two green glittering tufts; but what I could not understand was a pair of long white feathers, which stuck straight out from each shoulder.*

Ali had to convince Wallace that the bird was real. He than realised that he just got a new bird of paradise, and described it and sent it to the British Museum. Curator George Robert Gray (1808-1872) named the bird Wallace's standard wing.

The next morning we crossed the river before sunrise. A Moluccan Scops Owl (*Otus magicus* (Müller, 1841)) flew silently over our heads. After a tough 45 minutes walk we reached an empty riverbed. One bird of paradise was calling, though it sounded still weak. As soon as the call was louder we walked to the observation platform up the hill. Although its voice was loud and clear, the bird itself was not more than an outline between the leaves. When the sun came up, the metallic green feathers glittered in the morning light.

Finally five male birds showed up and sat on the bare branch, calling, jumping, hopping and turning. They played with their iridescent green breast shields and their white feathers, the standards, were erected and trembled. This went on for several minutes, until suddenly one of the birds could not contain himself any longer. He flew straight up from the branch, while he sang ecstatically. Then he opened his wings and used them as a parachute to land exactly where he took off. The others followed.

After an hour of display the only female left the lek. The males kept on calling, without success. She did not return.

'In Galela, one of the local languages of Halmahera, the bird is called 'wecca wecca', and in Bahasa Indonesia it is called 'Burung bidadari', the 'fairy bird', Pak Anu told me with a smile on his face. 'I came up with that last name. Nowadays it is the official Indonesian name.'

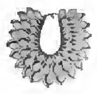
I asked Pak Anu whether it was possible to observe the golden birdwing butterfly, and if he knew a place to find it.

'That should not be a problem,' Pak Anu assured me, as we walked back from the forest. 'It is a rather common butterfly here. The best place to find it is along the old logging road, where you will also find the paradise crow, the other bird of paradise of Halmahera. I will take you there.'

I had seen the golden bird wing once, in a drawer in the personal cabinet of Wallace, now in the Museum of Natural History, in London. Evolutionary biologist and director of the Wallace Correspondence Project, George Beccaloni, showed me the butterfly. He pointed out a fingerprint on the velvety black part of one of its wings. Unnoticed it sealed my faith. From that moment I decided that I wanted to see the butterfly alive in Indonesia.

A few days later I found out that Pak Anu was right. I walked along the old logging road, with Eclectus Parrots (*Eclectus roratus* (Müller, 1841)) and fruit doves (*Ptilinopus* sp.) in the trees, when suddenly a large dark object appeared in my sight. It was a birdwing, hovering over the road. I followed it for some time, before it flew over the bushes into the forest:

> *I found it to be as I had expected, a perfectly new and most magnificent species, and one of the most gorgeously coloured butterflies in the world. Fine specimens of male are more than seven inches across the wings, which are velvety black and fiery*



orange, the latter colour replacing the green of the allied species. The beauty and brilliancy of this insect are indescribable, and none but a naturalist can understand the intense excitement I experienced when I at length captured it. On taking it out of my net and opening its glorious wings, my heart began to beat violently, the blood rushed to my head, and I felt much more like fainting than I have done when in apprehension of immediate death.

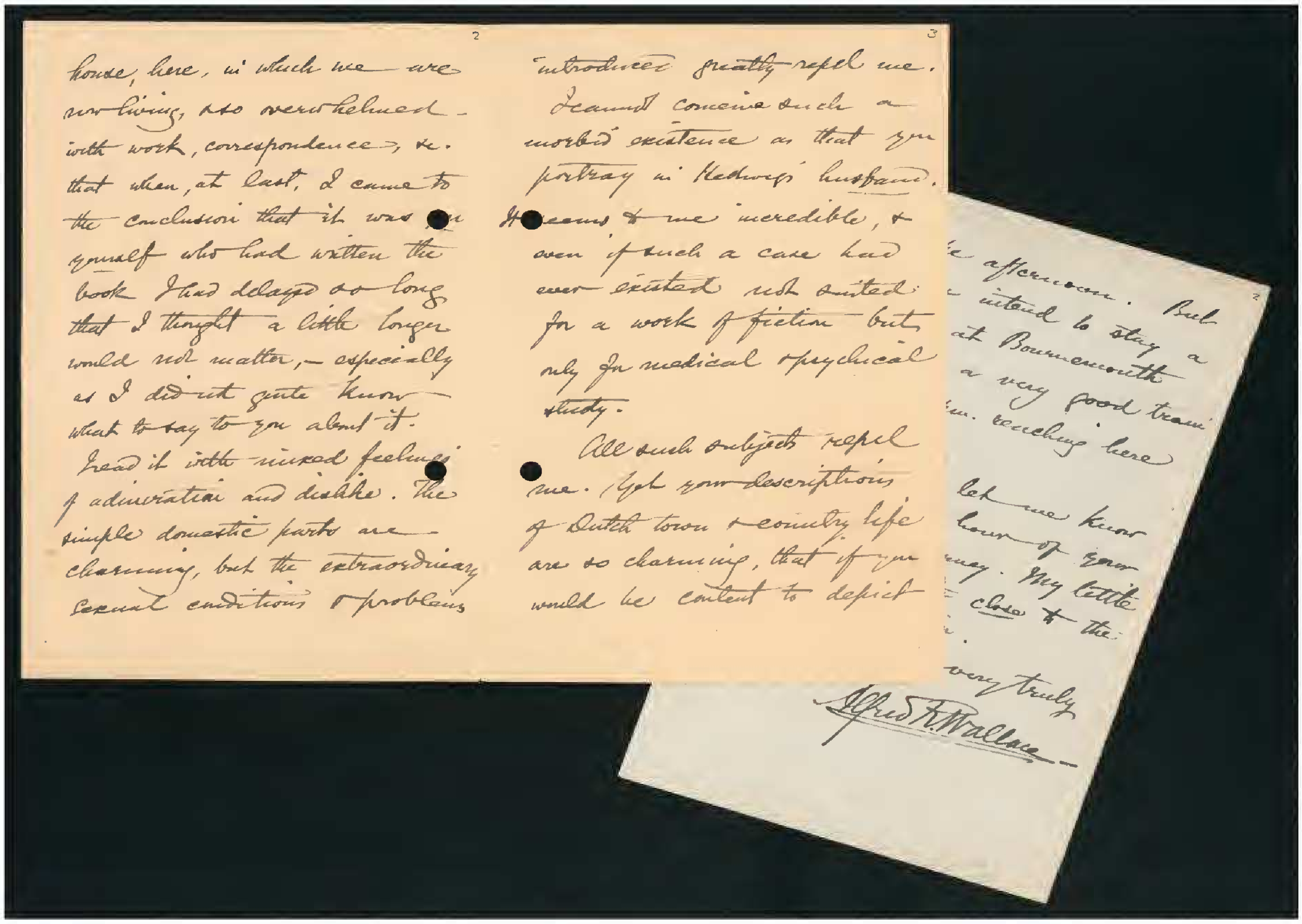
This lyrical description of the butterfly is typical for Wallace, as is the sentence that followed the enthusiastic part: 'I had a headache the rest of the day (...).'

Fortunately these two magnificent animals, described in *The Malay Archipelago* are rather easy to observe. That does not count for all the animals described. In fact, one can read *The Malay Archipelago* not just as a travel book, a natural history book or an exposé on biogeography, but it can also be read as a reference for nature conservationists. For instance, Wallace wrote about the tigers in Singapore that killed a Chinese everyday, about the fact that rhino's 'abound' in Sumatra, about the large numbers and different species of butterflies in Batimurung, Southern-Sulawesi and about the babirusa's he tried to shoot just outside Manado in Northern-Sulawesi.

Books like *The Malay Archipelago* and the book you are reading at the moment make us aware of the vulnerability of nature. Just remember that there are now no wild tigers in Singapore, the Sumatran rhino (*Dicerorhinus sumatrensis* (Fischer, 1814)) is one of the most endangered species in the world (the Javan rhino, *Rhinoceros sondaicus* Desmarest, 1822) is rarer, but the population is more stable compared to the Sumatran rhino), the only butterflies you are likely to see in Bantimurung are for sale at the entrance of the park, and if you want to see a babirusa (*Babyrousa* sp.) you will have to travel about two days from Manado to see them, in a heavily protected area; and this has all happened in just a little over 150 years.

In search of the Greater Bird of Paradise

For the last leg of my journey in Wallace's wake I travelled to the Aru Islands, a little archipelago in the shallow sea between Papua and Australia. I learned about the islands by reading Wallace. It immediately felt a romantic idea: sailing to the Aru's.



2

house, here, in which we are
now living, & so overwhelmed
with work, correspondence, &c.
that when, at last, I came to
the conclusion that it was you
yourself who had written the
book I had delayed so long
that I thought a little longer
would not matter, — especially
as I did not quite know
what to say to you about it.
I read it with mixed feelings
of admiration and dislike. The
simple domestic parts are
charming, but the extraordinary
sexual conditions & problems

3

introduced greatly repel me.
I cannot conceive such a
morbid existence as that you
portray in Hedwig's husband.
It seems to me incredible, &
even if such a case had
ever existed not suited
for a work of fiction but
only for medical & psychical
study.
All such subjects repel
me. Yet your descriptions
of Dutch town & country life
are so charming, that if you
would be content to depict

2

e afternoon. But
intend to stay a
at Bournemouth
a very good train
m. reaching here

let me know
hour of your
ney. My little
close to the
.

very truly
Alfred R. Wallace

Figure 7. Letter from Alfred Russel Wallace to the Dutch author Frederick van Eeden (© Artis Library, Special Collections of the University of Amsterdam).

When looking at the map one might think that the Aru Islands consist of one large island and several satellite-islands. A closer look shows little lines that divide the large island into smaller ones, like cracks in a Chinese vase.

In his article 'On the Natural History of the Aru Islands', published in *The Annals and Magazine of Natural History* in January 1858, Wallace explained the connection between the island of New Guinea and the Aru archipelago, based on these channels:

> *But there is another circumstance still more strongly proving this connexion: the great island of Aru, 80 miles in length from north to south, is traversed by three winding channels of such uniform width and depth, though passing through an irregular, undulating, rocky country, that they seem portions of true rivers, though now occupied by salt water, and open at each end to the entrance of the tides. This phænomenon is unique, and we can account for their formation in no other way than by supposing them to have been once true rivers, having their source in the mountains of New Guinea, and reduced to their present condition by the subsidence of the intervening land.*

This idea is supported by the fact that the fauna of the Aru Islands is quite similar to that of the southern part of New Guinea.

I travelled to Maekor, a little protestant village on an island of the same name. Three local hunters took me deep into the jungle and showed me tree kangaroos, different species of cuscus, palm cockatoos and all kinds of parrots. But above all they brought me to the display trees of the Greater Bird of Paradise (*Paradisaea apoda* Linnaeus, 1758). Early in the morning I observed the male birds singing, dancing and displaying their creamy white and yellow feathers to the nearby females. Immediately I recalled the engraving of the Aru islanders hunting for birds of paradise in *The Malay Archipelago*. The hunters climbed up trees and from under a roof of leaves they shot the birds with bows and blunt arrows.

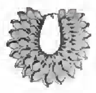
I showed the image to my company. They laughed about it.

'Our grandfathers used to hunt like that, until about 35 years ago,' one said. 'But nowadays we simple use airguns; more easy and much more effective.'

The last bird of paradise I saw in the jungle of Maekor was the King Bird of Paradise (*Cicinnurus regius* (Linnaeus, 1758)), a lovely crimson red and white bird, with coin-like feathers at the end of its two elongated tail wires. The delicate dance was overwhelming, and I fell in love immediately. So did Wallace. When he first saw this bird of paradise in the forest of the Aru Islands he became poetic and lyrical:

> *The remote island in which I found myself situated, in an almost unvisited see, far from the tracks of merchant fleets and navies; the wild, luxuriant tropical forest, which stretched far away on every side; the rude uncultured savages who gathered around me - all had their influence in determining the emotions with which I gazed upon this "thing of beauty" (the king bird of paradise, AR). I thought of the long ages of the past, during which the successive generations of this little creature had run their course - year by year being born, and living and dying amid these dark and gloomy woods, with no intelligent eye to gaze upon their loveliness; to all appearance such a wanton waste of beauty. Such ideas excite a feeling of melancholy. It seems sad that on the one hand such exquisite creatures should live out their lives and exhibit their charms only in these wild, inhospitable regions, doomed for ages yet to come to hopeless barbarism; while on the other hand, should civilised man ever reach these distant lands, and bring moral, intellectual, and physical light into the recess of these virgin forests, we may be sure that he will so disturb the nicely-balanced relations of organic and inorganic nature as to cause the disappearance, and finally the extinction, of these very beings whose wonderful structure and beauty he alone is fitted to appreciate and enjoy. This consideration must surely tell us that all living things were not made for man. Many of them have no relation to him. The cycle of their existence has gone on independently of his, and is disturbed or broken by every advance in man's intellectual development; and their happiness and enjoyments, their loves and hates, their struggles for existence, their vigorous life and early death, would seem to be immediately related to their own well-being and perpetuation alone, limited only by the equal well-being and perpetuation of the numberless other organisms with which each is more or less intimately related.*

This is not only beautifully written but, in my opinion, a prophetic message from *The Malay Archipelago*. Animals are not made for man, but for each other. And when (the 'civilized') man enters their habitat, there is a great chance that the ecological balance will be disturbed.



Darwin versus Wallace

Still one question is yet unanswered: How is it possible that almost everybody knows Darwin, whilst few people know Wallace?

An often-heard explanation for this fact is the difference in class, with Darwin from upper-middle class while Wallace was from the lower-middle class.

Maybe it was not the class difference itself, but a consequence of it: due to his father's poor speculations and investments, Wallace had to leave school and earn money at a very young age. He had to sell (some of) his collected specimens to finance his expeditions, while Darwin was from a very wealthy family, and was able to dedicate all his time and energy to his scientific work. It is reflected in both of the naturalists' oeuvres. As a guest researcher of the Special Collections of the University of Amsterdam, I frequently work in the Artis Library, one of the finest Natural History libraries in The Netherlands. As an experiment I tried to collect together the works of Darwin and Wallace. Darwin was easy. His oeuvre was grouped, together with related publications, in two bookcases next to a bust of the great naturalist.

Wallace's works were more difficult to gather together, since his oeuvre is scattered through the whole library, with his books on evolution closely positioned to those of Darwin, *The Geographical Distribution* and *Island Life* in the Biogeography section, while *The Malay Archipelago* and *A Narrative of travels on the River Amazon and Rio Negro* can be found on the shelves of the travel section. Several book titles, like *The Wonderful Century* and *Is Mars Habitable?* and *The Revolt of Democracy* can not even be found in the collection, since they are not works on natural history. In the depot (the former stables for the zebra's of the nearby zoo), out of sight to the public, are the volumes with magazines and annals of scientific societies. Here, the majority of the hundreds of articles written by Wallace can be found, including the joint publication of Darwin and Wallace from 1858, in the *Proceedings of the Linnean Society*.

The Dwarf's House

Hereby, I conclude this chapter on Alfred Russel Wallace, which, I have to confess, is far from complete. I have not discussed his problems concerning evolution by sexual selection, his ideas about the colouring of animals, or his spiritualism, on which he wrote the fascinating 'The Scientific Aspects of the Supernatural.'

But let me finish this piece how I started it: the housing issue. Because, at last one of Wallace's houses in the Malay Archipelago can be visited - although it is a rebuilt one. Tony Whitten (of Fauna & Flora International) and Dick Bergsma (of Seatrek Bali) commissioned a group of local carpenters in the village of Yenbeser, on the island of Gam in the Raja Ampat archipelago, to build a little house just like the one Wallace lived in during his six weeks stay on the island. They looked carefully at the engraving of the house in *The Malay Archipelago*, and used the measurements from the clear description that Wallace himself gave in his book:

It was quite a dwarf's house, just eight feet square, raised on posts so that the floor was four and a half feet above the ground, and the highest part of the ridge only five feet above the floor.

Between the posts under the floor Wallace had put a table, chair, shelves and his insect boxes. He was able to work there, although he had to crawl to reach the chair and table. When you look carefully at the engraving in the book you can actually see Wallace sitting in his wicker chair.

The newly built house looks almost identical to the house on the engraving. The only difference is that you will not find Alfred Russel Wallace working between the posts. Unfortunately.

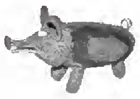
PostScript

Currently the forests of the Aru Islands, home to the tree kangaroo (*Dendrolagus* sp.), the Greater Bird of Paradise (*Paradisaea apoda* L.) and the Palm Cockatoo (*Probosciger aterrimus* Gmelin, 1788), is under serious threat.

The Java based company 'PT Menara' is planning to cut about 70% of the forest, to grow sugarcane. The logging has already started on the southern most island Tranggan...

Acknowledgements

The author is very grateful to Dr. George Beccaloni (the Natural History Museum, London, United Kingdom), who reviewed and improved this chapter.



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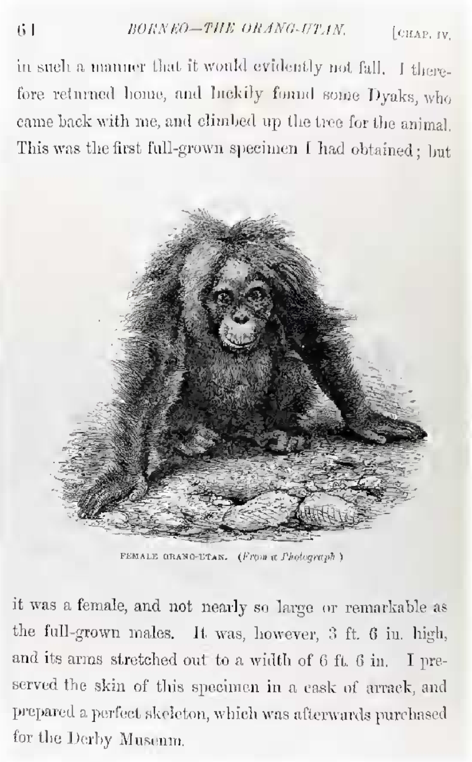

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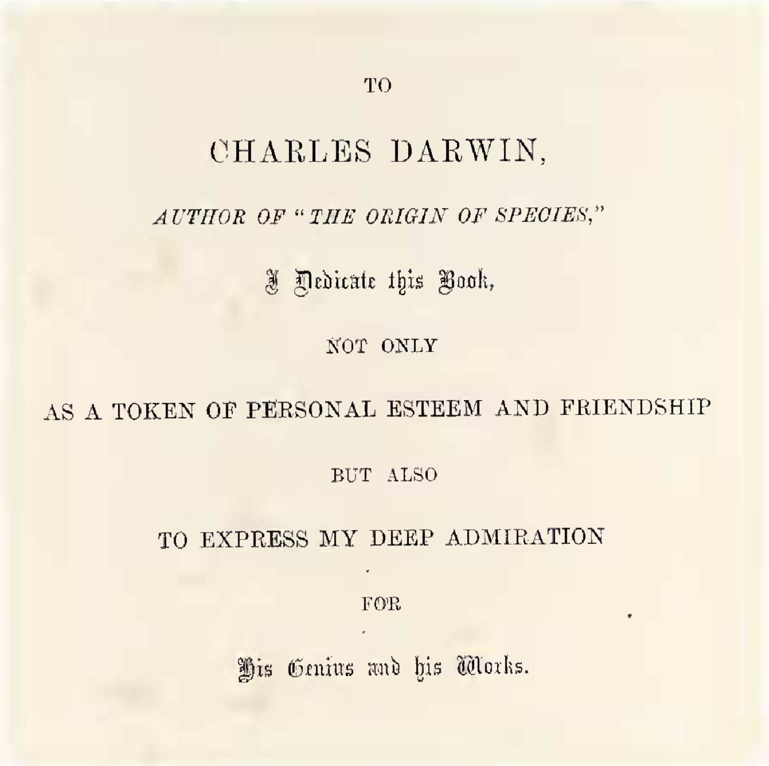
in such a manner that it would evidently not fall. I therefore returned home, and luckily found some Dyaks, who came back with me, and climbed up the tree for the animal. This was the first full-grown specimen I had obtained; but

FEMALE ORANG-UTAN. (*From a Photograph*.)

it was a female, and not nearly so large or remarkable as the full-grown males. It was, however, 3 ft. 6 in. high, and its arms stretched out to a width of 6 ft. 6 in. I preserved the skin of this specimen in a cask of arrack, and prepared a perfect skeleton, which was afterwards purchased for the Derby Museum.

Figure 8. Illustration of an Orangutan (*Pongo* sp.), from 'The Malay Archipelago' (© Artis Library, Special Collections of the University of Amsterdam).



TO

CHARLES DARWIN,

AUTHOR OF "THE ORIGIN OF SPECIES,"

I Dedicate this Book,

NOT ONLY

AS A TOKEN OF PERSONAL ESTEEM AND FRIENDSHIP

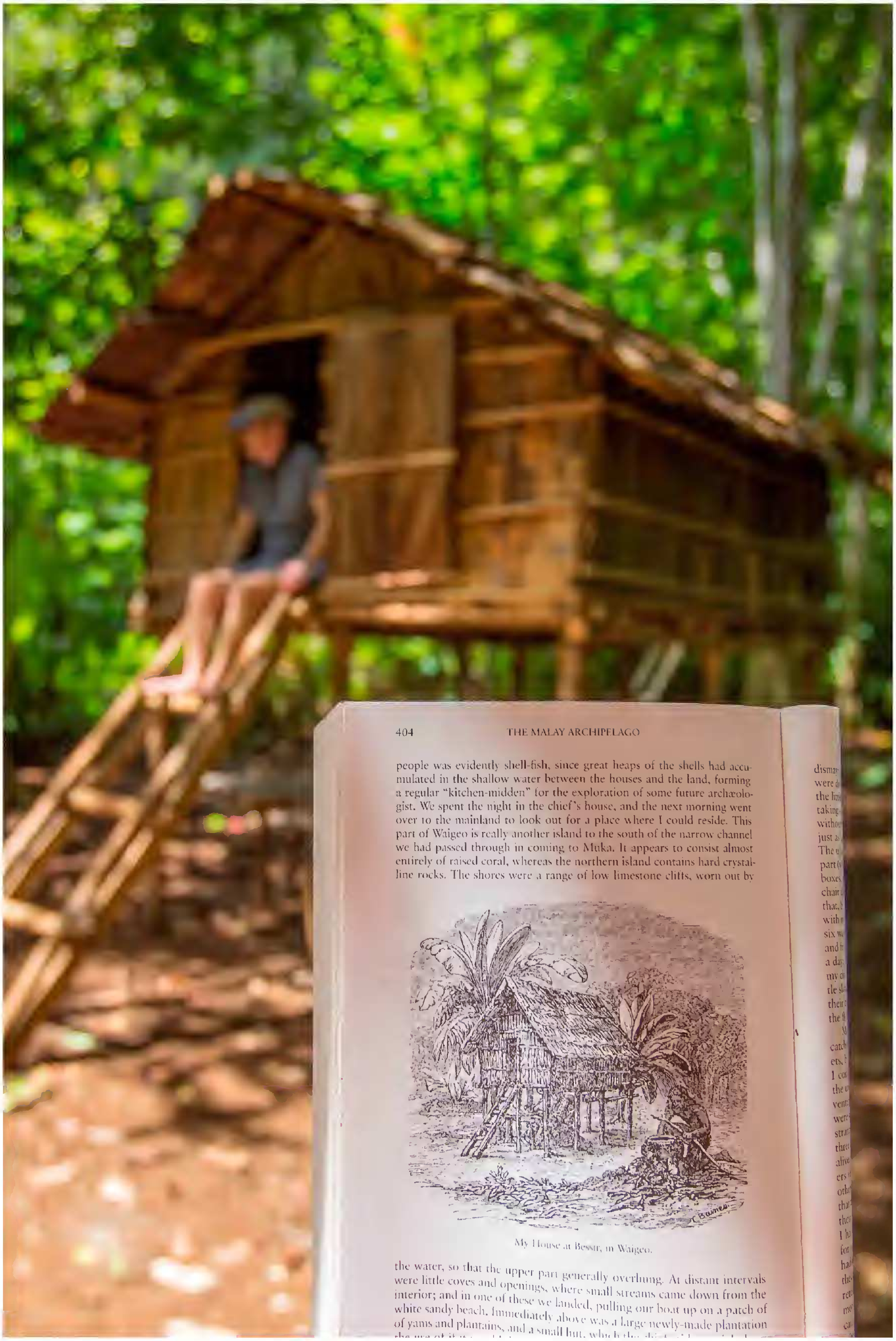
BUT ALSO

TO EXPRESS MY DEEP ADMIRATION

FOR

His Genius and his Works.

Figure 9. Dedication to Darwin, in 'The Malay Archipelago' (© Artis Library, Special Collections of the University of Amsterdam).



404 THE MALAY ARCHIPELAGO

people was evidently shell-fish, since great heaps of the shells had accumulated in the shallow water between the houses and the land, forming a regular "kitchen-midden" for the exploration of some future archæologist. We spent the night in the chief's house, and the next morning went over to the mainland to look out for a place where I could reside. This part of Waigeo is really another island to the south of the narrow channel we had passed through in coming to Muka. It appears to consist almost entirely of raised coral, whereas the northern island contains hard crystalline rocks. The shores were a range of low limestone cliffs, worn out by

My House at Bessir, in Waigeo.

the water, so that the upper part generally overhung. At distant intervals were little coves and openings, where small streams came down from the interior; and in one of these we landed, pulling our boat up on a patch of white sandy beach. Immediately above was a large newly-made plantation of yams and plantains, and a small hut, which the chief said we might have

Figure 10. Replica of Wallace's hut in Gam Island, Raja Ampat archipelago (shown with the original engraving from 'The Malay Archipelago') (photo: S. Bali).

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www.wallaceletters.info

ALEXANDER REEUWIJK

Reizen tussen de lijnen

Dwars door Indonesië met
Alfred Russel Wallace

MET TEKENINGEN VAN RIA WINTERS

atlas contact

Figure 11. Cover of author's book 'Travelling between the lines' (Dutch edition).